

# Chemistry I

## Midterm Examination Reference Materials



DO NOT WRITE IN THIS BOOKLET

## General Formulas for Chemistry I

$$\% \text{ Error} = \left( \frac{|\text{experimental value} - \text{accepted value}|}{\text{accepted value}} \right) \times 100\%$$

$$\% \text{ yield} = \left( \frac{\text{actual mass of product}}{\text{predicted mass of product}} \right) \times 100\%$$

$$E = hf$$

$$c = \lambda f$$

$$E = mc^2$$

$$D = \frac{m}{v}$$

Symbols and Charges for Polyatomic Ions			
Symbol	Name	Symbol	Name
$\text{NO}_3^{-1}$	nitrate	$\text{ClO}_4^{-1}$	perchlorate
$\text{NO}_2^{-1}$	nitrite	$\text{ClO}_3^{-1}$	chlorate
$\text{OH}^{-1}$	hydroxide	$\text{ClO}_2^{-1}$	chlorite
$\text{CO}_3^{-2}$	carbonate	$\text{BO}_3^{-3}$	borate
$\text{PO}_4^{-3}$	phosphate	$\text{B}_4\text{O}_7^{-2}$	tetraborate
$\text{HCO}_3^{-1}$	bicarbonate	$\text{BrO}_3^{-1}$	bromate
$\text{SO}_4^{-2}$	sulfate	$\text{BrO}^{-1}$	hypobromite
$\text{SO}_3^{-2}$	sulfite	$\text{IO}_3^{-1}$	iodate
$\text{MnO}_4^{-1}$	permanganate	$\text{IO}^{-1}$	hypoiodite
$\text{CrO}_4^{-2}$	chromate	$\text{Cr}_2\text{O}_7^{-2}$	dichromate
$\text{ClO}^{-1}$	hypochlorite	$\text{O}_2^{-2}$	peroxide
$\text{CN}^{-1}$	cyanide	$\text{NH}_2^{-1}$	amide
$\text{C}_2\text{O}_4^{-2}$	oxalate	$\text{PO}_3^{-3}$	phosphite
$\text{S}_2\text{O}_3^{-2}$	thiosulfate	$\text{HS}^{-1}$	hydrogen sulfide
$\text{AsO}_4^{-3}$	arsenate	$\text{SeO}_4^{-2}$	selenate
$\text{SiO}_3^{-2}$	silicate	$\text{C}_4\text{H}_4\text{O}_6^{-2}$	tartrate
$\text{H}_2\text{PO}_4^{-1}$	dihydrogen phosphate		
$\text{SiF}_6^{-2}$	hexafluorosilicate		
Polyatomic ions with 2 names			
$\text{HSO}_4^{-1}$	hydrogen sulfate or bisulfate		
$\text{HSO}_3^{-1}$	hydrogen sulfite or bisulfite		
$\text{HC}_2\text{O}_4^{-1}$	hydrogen oxalate or bioxalate		
$\text{HPO}_4^{-2}$	hydrogen phosphate or biphosphate		
$\text{HCO}_3^{-1}$	hydrogen carbonate or bicarbonate		
Special Cases			
$\text{NH}_4^{+1}$	ammonium	These are positive polyatomic ions	
$\text{Hg}_2^{+2}$	mercurous or mercury I		
* There are 2 accepted symbols for the acetate ion.			
Acetate*	$\text{C}_2\text{H}_3\text{O}_2^{-1}$ or $\text{CH}_3\text{COO}^{-1}$		

Notes:

There is some discussion about the mercury I charged species. Some chemists think this is a polyatomic ion.

### Electronegativities of Selected Elements

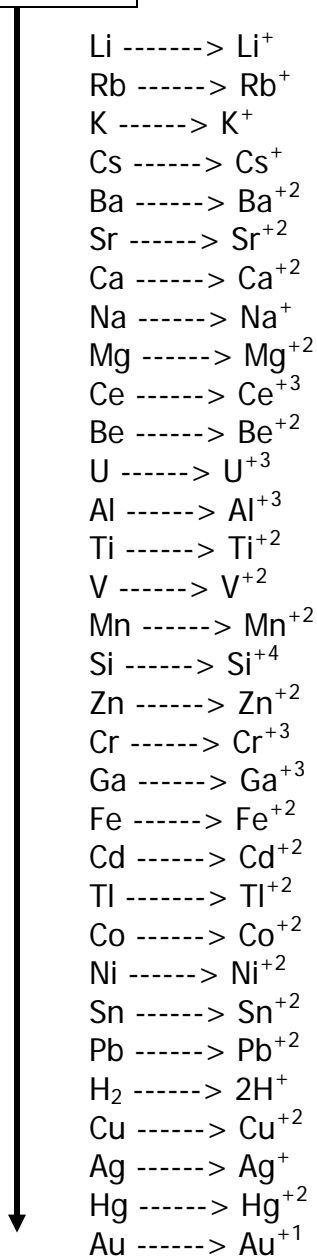
Atomic Number	Symbol	Electronegativity
1	H	2.1
3	Li	1.0
4	Be	1.5
5	B	2.0
6	C	2.5
7	N	3.0
8	O	3.5
9	F	4.0
11	Na	0.9
12	Mg	1.2
13	Al	1.5
14	Si	1.8
15	P	2.1
16	S	2.5
17	Cl	3.0
19	K	0.8
20	Ca	1.0
21	Sc	1.3
22	Ti	1.5
23	V	1.6
24	Cr	1.6
25	Mn	1.5
26	Fe	1.8
27	Co	1.8
28	Ni	1.8
29	Cu	1.9
30	Zn	1.6
35	Br	2.8
37	Rb	0.8
53	I	2.5

Bond determination: difference in electronegativities

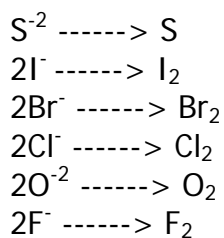
0.0 to 0.4	nonpolar covalent
0.5 to 1.7	polar covalent
1.7 to 4.0	ionic

# Chemistry I: Electromotive Series Reference Sheet

Decreasing  
Reactivity



Increasing  
Reactivity



Notes: Hydrogen is a nonmetal but behaves like a metal. Silicon is a metalloid and can behave like a metal.